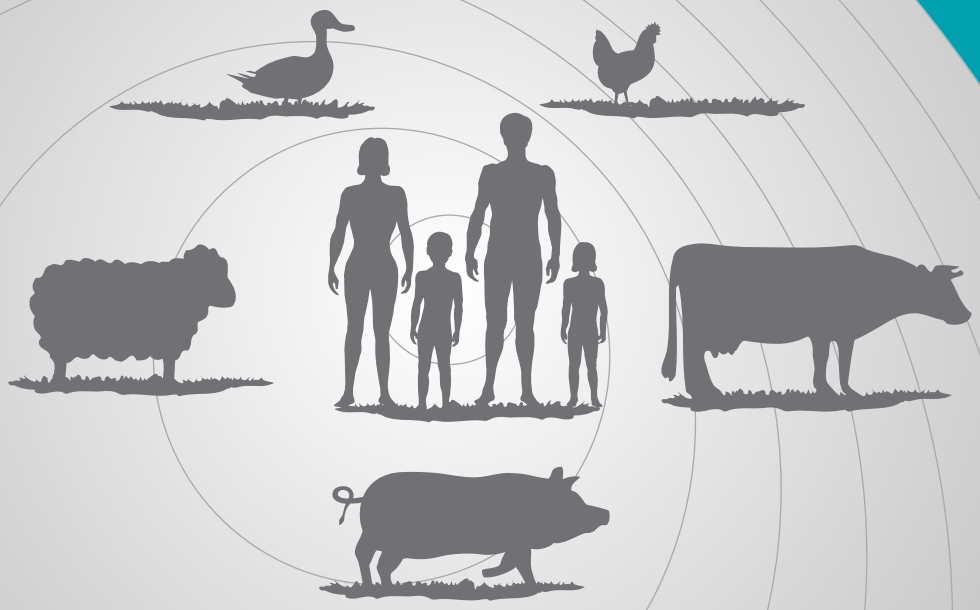
ZOONOSES

IN IRELAND UPDATE FOR 2009



Food Safety
AUTHORITY OF IRELAND

hpsc

Department of
Agriculture,
Fisheries and Food
An Roinn
Talmhaíochta,
Iascaigh agus Bia

ZOONOSES

IN IRELAND **UPDATE FOR 2009**

Published by:
Food Safety Authority of Ireland
Abbey Court
Lower Abbey Street
Dublin 1

Advice Line: 1890 336677
Tel: 01 817 1300
Fax: 01 817 1301
Email: info@fsai.ie
Website:www.fsai.ie

ISBN 1-904465-82-X

CONTENTS

INTRODUCTION

Zoonoses are diseases and infections naturally transmissible from vertebrate animals to man by direct contact with infected animals, insects or *via* animal excreta in the environment. While it is possible for anybody to become infected with a zoonotic agent, certain population groups such as the very young, the elderly and immunocompromised are particularly vulnerable to infection and at greater risk of more serious consequences. The eradication of zoonoses in humans and animals is a difficult, if not impossible, goal to achieve. However, the impact of zoonoses on the health of humans and animals can be limited by monitoring the reservoirs of infectious zoonotic agents with a view to understanding and controlling their modes of transfer, while educating the public about how to avoid or limit the risk of infection.

The European Community system for monitoring and reporting information on zoonoses is based on Directive 2003/99/EC. Annually, the European Food Safety Authority (EFSA) publishes a Community report on zoonoses and foodborne outbreaks in the European Union. While general pan-European trends may be deduced from Community reports, they should be viewed in context, taking into account, variations in culture, diet, animal husbandry practices, types and extent of external borders, as well as national sampling, testing and reporting regimes.

The addition of a number of zoonoses to the list of notifiable human diseases in Europe in 2004 has had an effect on the reported incidence rates of some zoonoses. The expanded list has resulted in a more accurate reflection of the incidence and impact of such diseases in Ireland, which in turn should permit a more confident assessment of emerging trends.

This zoonoses update presents available zoonotic data for Ireland for 2009.

1. CAMPYLOBACTERIOSIS

HUMAN

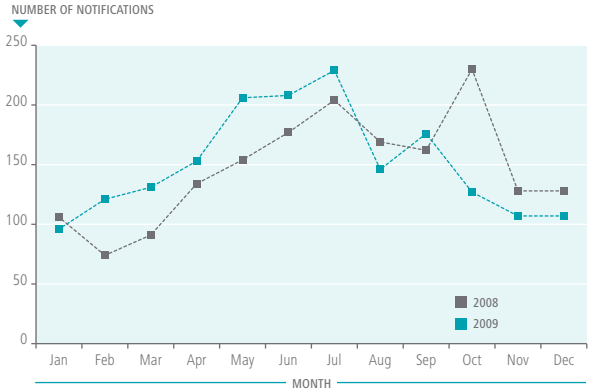
Campylobacteriosis is the most common bacterial cause of gastroenteritis in Ireland and Europe. In 2009, 1,807 cases were notified in Ireland, 71 more notifications than in 2008. This is a crude incidence rate (CIR) of 42.6 per 100,000 of the population of Ireland, compared to a reported CIR of 45.6 per 100,000 notified in Europe (Figure 1.1) (HPSC, 2010, EFSA 2011a).

Figure 1.1. CIR of campylobacteriosis notifications per 100,000 population, in Ireland 1999-2009 and EU 2004-2009

(Source: HPSC & EFSA)

The seasonal distribution of *Campylobacter* spp. is typically characterised by an increased incidence rate during the summer months. Notification of campylobacteriosis peaked in May (n=206), June (n=208) and July 2009 (n=229), a second smaller peak was observed in September (n=176) of the same year (Figure 1.2).

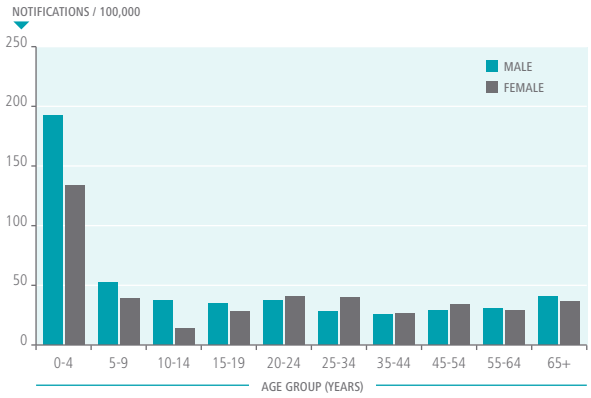
Figure 1.2. Seasonal distribution of campylobacteriosis notifications, Ireland 2008 versus 2009



(Source: HPSC)

Campylobacteriosis was reported in all age groups with the highest burden of illness experienced in children aged 0-4 years, a trend also observed at the European level in 2009 (Figure 1.3.) (EFSA, 2011b). A predominance of male cases was observed in the age categories 0-19 and in individuals over 65 in this year.

Figure 1.3. Age-specific incidence of campylobacteriosis, Ireland 2009



(Source: HPSC)

During 2009, 9 family outbreaks of Campylobacteriosis were notified, with 33 associated cases of illness. The mode of transmission was described in 7 outbreaks. Six were reported to be the result of person-to-person transmission (4 of which were believed to have a food transmission element), while food and animal contact were suggested as possible causes for the remaining outbreak.

FOOD

The zoonoses data for Ireland for 2009 revealed that all of the food products confirmed positive in this year were broiler meat and meat products (162 raw, 3 non specified (NS), 1 ready-to-eat), with the exception of 3 raw duck samples (Table 1.1). An EFSA opinion estimated that handling, preparation and consumption of broiler meat may account for 20% to 30% of human cases of campylobacteriosis in the EU; while a separate EFSA report suggested that the introduction of certain measures after poultry slaughter, i.e. cooking, freezing and irradiation, could reduce the risk of human cases by up to 50% in some Member States (EFSA, 2011c).

In 2008, an FSAI/Health Service Executive (HSE) survey conducted in retail shops found that 13.2% of the external surface of chicken packaging and 10.9% of the surface of display cabinets were contaminated with *Campylobacter* spp. (FSAI, 2010b). The study found a higher level of *Campylobacter* spp. on the exterior of conventional packaging (18.9%), than on packaging designed to be leak-proof (2.1%). The study also found that retail cabinets displaying conventionally packaged chicken were far more likely to have evidence of leakage of potentially contaminated meat juices (17.2%), than leak-proof packaging (6.3%), indicating that retailers like poultry producers and processors have a role to play in reducing the exposure of consumers to *Campylobacter* spp.

While no microbiological criteria for *Campylobacter* spp. are specified in legislation, a ready-to-eat product confirmed as positive for *Campylobacter* spp. should be withdrawn/recalled from the market as per Article 19 of Regulation (EC) No 178/2002.

Table 1.1. Number of samples tested and samples positive for *Campylobacter* spp. by food type and sampling site, 2009

FOOD TYPE	SAMPLING SITE	RTE STATUS	TESTED	POSITIVE
FRESH MEAT				
Broiler	Processing	Raw	273	162
Duck	Processing	Raw	12	3
MEAT PRODUCTS				
Broiler	Processing	RTE	32	0
	Retail	RTE	236	1
		Raw	4	0
		NS	229	3
Turkey	Processing	RTE	49	0
	Retail	RTE	61	0
		NS	50	0
Duck	Processing	RTE	17	0
	Retail	RTE	9	0
		NS	4	0
Unspecified poultry meat	Processing	RTE	13	0
		Raw	1	0
Pork	Processing	RTE	29	0
	Retail	RTE	92	0
		Raw	2	0
		NS	111	0
Beef	Processing	RTE	3	0
	Retail	RTE	49	0
		Raw	1	0
		NS	42	0
Lamb	Retail	RTE	6	0
		NS	3	0
Unspecified & mixed meat products	Processing	RTE	1	0
	Retail	RTE	32	0
		Raw	1	0
		NS	36	0

FOOD TYPE	SAMPLING SITE	RTE STATUS	TESTED	POSITIVE
OTHERS				
Fishery/seafood products	Retail	Raw	3	0
		NS	11	0
Milk and milk products	Retail	RTE	17	0
		Raw	12	0
Eggs & egg products	Retail	Raw	3	0
Fruit & vegetables & juices	Retail	Raw	5	0
		NS	7	0
Processed food & prepared dishes	Retail	NS	162	0
Other foods	Retail	RTE	32	0
		NS	7	0
Overall Total			1,657	169 (10.2%)
consisting of				
Total RTE			671	1 (0.15%)
Total Raw			307	165 (53.8%)
Total NS			679	3 (0.44%)

(Source: FSAI, DAFF & OFMLS)

RTE: Ready-to-eat, NS: Not Specified

ANIMALS

Many domestic and farm animals, in particularly poultry, are readily colonised with *C. jejuni* and to a lesser extent *C. coli*. *Campylobacter* spp. were detected in 213 (8.0%) of the 2,668 animals tested in 2009 (Table 1.2.) and 8% of cattle and 7.4% of sheep were found to be positive for *C. jejuni*. In 2009, 133 of 157 official poultry slaughterhouse samples tested were confirmed positive for *Campylobacter* spp., giving an overall percentage of 84.7%. This result is similar to an EU baseline study conducted in 2008, which reported that 83% of chickens (broilers) were infected on arrival at slaughterhouses in Ireland and 98% of carcasses were contaminated at the end of the slaughter process. These figures confirm the high prevalence of this pathogen on Irish chickens (EFSA, 2010). Consequently in 2011, the FSAI's Scientific Committee published recommendations for a practical control programme for *Campylobacter* spp. in the Irish production and slaughter chain (FSAI, 2011).

Table 1.2. Isolation of *Campylobacter* spp. from animals, 2009

ANIMAL	TESTED	POSITIVE	SEROTYPE
Cattle	2,373	189	*C. jejuni*
Sheep	245	18	*C. jejuni*
Pigs	3	1	*C. jejuni*
Chickens	0	0	–
Dogs	22	4	*C. jejuni*
Others	25	1	*C. jejuni*
Total	2,668	213 (8.0%)	

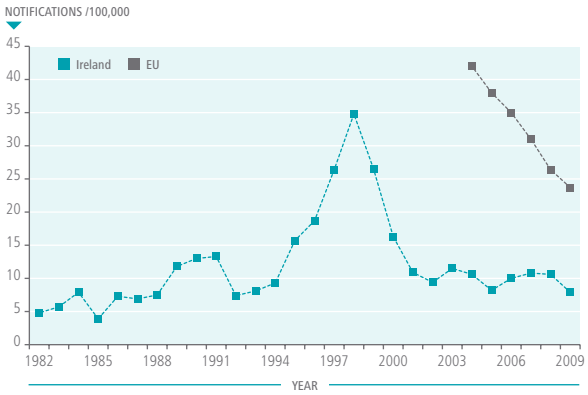
(Source: DAFF)

2. SALMONELLOSIS

HUMAN

Salmonellosis is a notifiable human disease in Ireland and its incidence rates have remained relatively stable since 2001. The national CIR for salmonellosis in 2009 was 7.9 per 100,000 population (Figure 2.1.). This is a decrease on the Irish CIR for 2008 which was 10.6 per 100,000 population, and is lower than the European CIR which was 23.7 per 100,000 in 2009 (HPSC, 2010, EFSA 2011a).

Figure 2.1. CIR of salmonellosis notifications per 100,000 population, Ireland 1982-2009 and EU 2004-2009

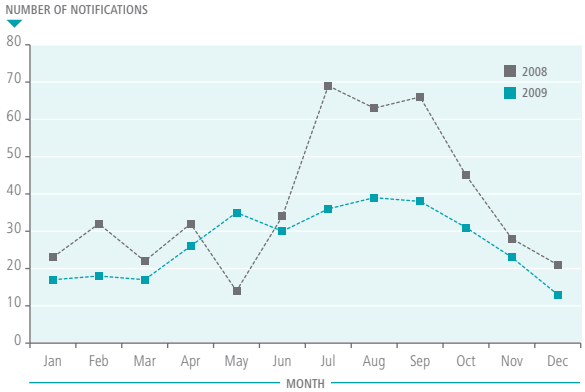


(Source: HPSC & EFSA)

Similar to previous years, the highest number of notifications occurred in the summer months (mid June to the start of October), when higher numbers of travel-associated cases were reported (Figure 2.2.). A history of recent travel was recorded in 35% of human cases of salmonellosis in 2009 (NSRL, 2010). More than half (55%) of the *S*. Enteritidis isolates identified by the NSRL were associated with foreign travel in this year, compared to 15% for *S*. Typhimurium.

A large reduction in notifications was observed in July to September when data for 2008 and 2009 were compared. An outbreak of *S*. Agona associated with ready-to-eat poultry, pork and beef food products in 2008, may be partly responsible for the peak in notifications during this period. This serotype was identified in 11 Irish cases and 152 cases throughout England, Scotland, Wales and 5 other European countries.

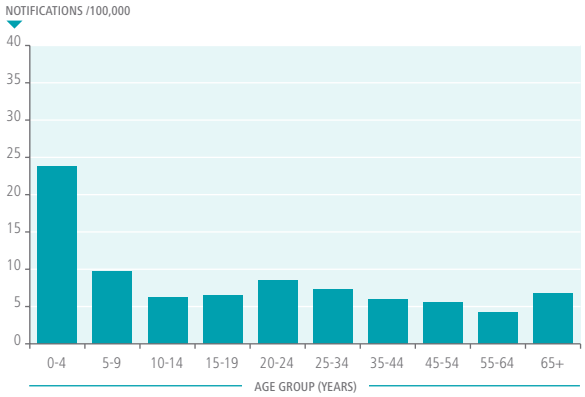
Figure 2.2. Seasonal distribution of human salmonellosis notifications, Ireland 2008 versus 2009



(Source: HPSC)

The female: male ratio of infection was 0.9:1.1 in 2009 respectively. In terms of age distribution, 21.6% of cases occurred in children under the age of 5 in this year (Figure 2.3). While this is noteworthy, it is possible that it is also a reflection of clinicians seeking clinical samples in children under the age of 5.

Figure 2.3. Age-specific incidence rate of salmonellosis notifications, Ireland, 2009



(Source: HPSC)

The most common *Salmonella* spp. serotype referred to the NSRL in 2009 was *S*. Typhimurium (32.2%), followed by *S*. Enteritidis (23.8%) (Table 2.1). These figures show similar levels of *S*. Typhimurium as reported in 2008 (31.1%), but a decrease in the number of *S*. Enteritidis isolates (27.3%).

Table 2.1. Serotype distribution of *Salmonella* spp. isolates referred to the NSRL, 2009

RANK	SEROTYPE	NUMBER	%
1	Typhimurium*	118	32.3%
2	Enteritidis	87	23.8%
3	Unnamed	12	3.3%
4	Typhi	11	3.0%
5	Paratyphi A	9	2.5%
6	Kentucky	7	1.9%
7	Dublin	6	1.6%
8	Agona	6	1.6%
9	Java	6	1.6%
10	Others**	104	28.4%
	Total	**366**	**100%**
	Non-typhoidal	**344**	**94%**

(Source: NSRL & HPSC)

* Includes 87 *S.* Typhimurium and 31 with serotype 4,5,12:i
** Includes 2 isolates of *S.* Paratyphi B (0.6%)

S. Enteritidis was the most frequently identified isolate referred to the NSRL between 2000 and 2007. However, a higher percentage of *S.* Typhimurium was referred in 2008 and 2009 (Figure 2.4.).

Figure 2.4. Percentage of *S.* Enteritidis and *S.* Typhimurium isolates referred to NSRL, 1998 to 2009

(Source: NSRL & HPSC)

There were 15 outbreaks of salmonellosis in Ireland in 2009, resulting in 93 persons ill and an associated hospitalisation rate of 21.5%. Twelve were family outbreaks (9 of which occurred in private houses), 2 were travel associated and 1 occurred across an extended family. In 2008, 22 outbreaks (79 persons ill) with an associated hospitalisation rate of 25% were reported.

One general outbreak was caused by a mixture of *S.* Kentucky and *S.* Agona strains resulting in 35 cases of illness, 7 of which were laboratory confirmed. Although no specific food item was implicated, the outbreak was suspected to be foodborne as all infected individuals were reported to have attended 1 of 2 private parties served by a single caterer.

While the 2009 figure shows a decrease of 31.8% on the number of salmonellosis outbreaks reported in the previous year, there was an 18% increase in the number of people ill from outbreaks.

ANTIMICROBIAL RESISTANCE IN CLINICAL ISOLATES OF *SALMONELLA* SPP.

The National *Salmonella* Reference Laboratory (NSRL) carry out antimicrobial susceptibility testing (in conjunction with serotyping) on *Salmonella* spp. isolates, recovered from clinical and non clinical sources in Ireland.

Similar to previous years, *S*. Typhimurium had the highest level of antimicrobial resistance in 2009. *S*. Typhimurium is commonly resistant to ampicillin, chloramphenicol, streptomycin, sulphonamides, tetracycline and more recently trimethoprim; ACSSuT(Tm).The genes conferring this resistance are typically carried on the *Salmonella* genomic island 1 (SGI1), a structure which has the ability to collect and express resistance to these and other antimicrobials (due to the presence of a Class 1 integron). Multi-antimicrobial resistance (MAR); defined as resistance to 3 or more antimicrobials, is also emerging in Non-Typhimurium *Salmonella* spp. The transfer of MAR plasmids and the SGI1 island among *Salmonella* spp. is a cause for concern. In addition, the development of resistance to clinically significant antimicrobials such as quinolones and extended spectrum β-lactamases in *Salmonella* spp. should be monitored. Resistance to the quinolone nalidixic acid, is the first step in a 2 step mutation to resistance to ciprofloxacin; the clinical antibiotic of choice in the treatment of salmonellosis.

The antimicrobial susceptibility profiles of Irish clinical isolates of *S*. Typhimurium and Non-Typhimurium *Salmonella* spp. were examined for 2008 and 2009 (Figure 2.5. and 2.6.). A slight increase in resistanc e to ampicillin (only in non-Typhimurium isolates), streptomycin, sulphonamides, tetracycline and gentamycin were consistent for all *Salmonella* spp. studied. While an increase in resistance to chloramphenicol and nalidixic acid in Non-Typhimurium *Salmonella* spp. was reported, this was in contrast to a decrease in resistance to these antimicrobials in *S*. Typhimurium isolates. Low level resistance to ciprofloxacin, ceftazidime and cefotaxime were also observed in Non-Typhimurium *Salmonella* spp., but not in *S*. Typhimurium isolates for either year.

Figure 2.5. Antimicrobial resistance in Irish* clinical isolates referred to the NSRL of *S*. Typhimurium in 2008 (n=103) and 2009 (n=109)**

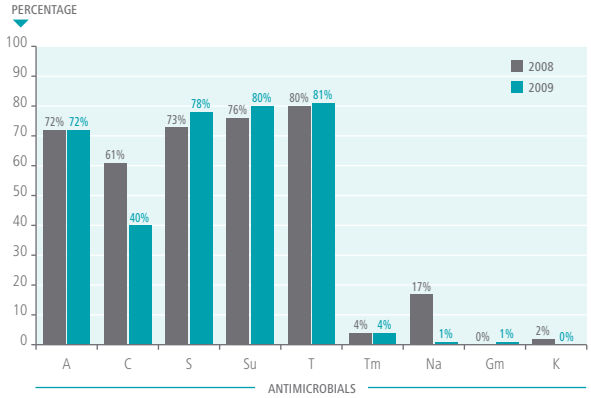
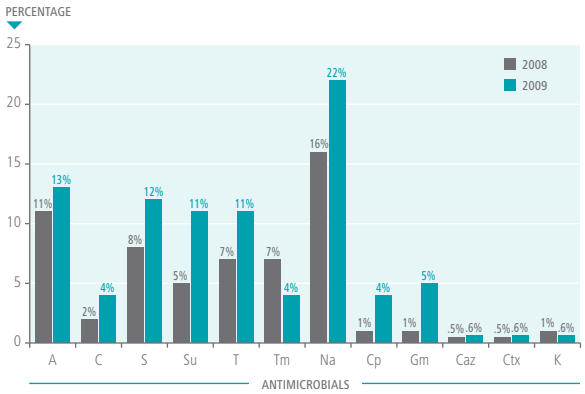


Figure 2.6. Antimicrobial resistance in Irish* clinical isolates referred to the NSRL of Non- Typhimurium *Salmonella* spp. in 2008 (n=184) and 2009 (n=163)**



(Source: NSRL)

* Not associated with foreign travel (a further 94 *Salmonella* spp. isolated in 2009 were recovered from individuals who had recently travelled outside of the country)

** Isolated from faeces, blood, sputum, urine, lung swab and unknown samples
– Ampicillin (A); Chloramphenicol (C); Streptomycin (S); Sulphonamides (Su); Tetracycline (T); Trimethoprim (Tm); Nalidixic acid (Na), Ciprofloxacin (Cp), Gentamycin (Gm), Ceftazidime (Caz); Cefotaxime (Ctx) and Kanamycin (K)

The antimicrobial resistance profiles of clinical non-Typhimurium *Salmonella* spp. in 2009 (corresponding to Figure 2.6) are listed in Table 2.2. Of these, 12.3% were defined as MAR, with one isolate (*S*. Concord) expressing resistance to nine antimicrobials. In 2008, 9.2% of clinical non-Typhimurium *Salmonella* spp. were MAR, with one isolate (serotype unnamed) expressing resistance to 8 antimicrobials.

Table 2.2. Antimicrobial resistance profiles of Irish* clinical Non-Typhimurium *Salmonella* spp. referred to the NSRL** (n=163), 2009

SALMONELLA SPP.	NO. OF ISOLATES	RESISTANCE PROFILE
S. Concord	**1**	**ACSSuTTmCazGmCtx**
S. Indiana	**1**	**ACSuTTmNaCpGm**
S. Kentucky	**5**	**ASSuTNaCpGm**
S. Mbandaka	**1**	**ACSSuTGm**
S. Haifa	**1**	**ACSSuTNa**
S. SaintPaul	**1**	**ASSuTTm**
Unnamed	**1**	**ACSSuTm**
Unnamed	**1**	**ACSSuT**
S. Derby	**1**	**ASTNa**
S. Poona	**1**	**ASuTm**
S. Agona	**4**	**SSuT**
S. Thompson	**1**	**TNaK**
S. Hadar	**1**	**STNa**
S. Worthington	1	TmNa
S. Enteritidis	2	ANa
S. Typhi	2	SNa
S. Enteritidis	16	Na
S. Dublin	2	Na
S. Typhi	1	Na
S. Paratyphi A	1	Na
S. Kentucky	1	Na
S. Virchow	1	Na
S. Enteritidis	4	A
S. Mbandaka	1	A
Unnamed	1	Su
Other *Salmonella* spp.	111	None

(Source: NSRL)

* Not associated with foreign travel (a further 94 *Salmonella* spp. isolated in 2009 were recovered from individuals who had recently travelled outside of the country)

** Isolated from faeces, blood, sputum, urine, lung swab and unknown samples
- Ampicillin (A); Chloramphenicol (C); Streptomycin (S); Sulphonamides (Su); Tetracycline (T); Trimethoprim (Tm); Nalidixic acid (Na), Ciprofloxacin (Cp), Gentamycin (Gm), Ceftazidime (Caz); Cefotaxime (Ctx) and Kanamycin (K)
- Isolates in bold are defined as multi-antimicrobial resistant, MAR; resistance to 3 or more antimicrobials.

FOOD

In 2009, 87,839 meat based food samples (134,878 food samples in total) were tested for *Salmonella* spp., with 0.72% of raw meat samples and 0.01% of ready-to-eat meat products reported positive for *Salmonella* spp. (Table 2.3). Commission Regulation (EC) No 2073/2005 on microbiological criteria for foodstuffs lays down criteria for *Salmonella* spp. in a variety of raw and ready-to-eat foodstuffs including: meats, dairy products, egg products, fish, fruit, vegetables and infant formula. The majority of samples tested in 2009 were 'industry own checks' representing 90.6% (n=122,137) of the total, as opposed to official samples which made up 9.4% (n=12,741) of the final figure. Industry own check samples are taken from processing plants and submitted to the Department of Agriculture, Fisheries and Food approved private laboratories for analysis for *Salmonella* spp. Serotyping is then performed by the Central Veterinary Research Laboratory (CVRL) which is the National Reference Laboratory (NRL) for *Salmonella* spp. in food, feed and animal health.

Table 2.3. Number of samples tested and number of samples positive for *Salmonella* spp. in meat by food type and sampling site, 2009

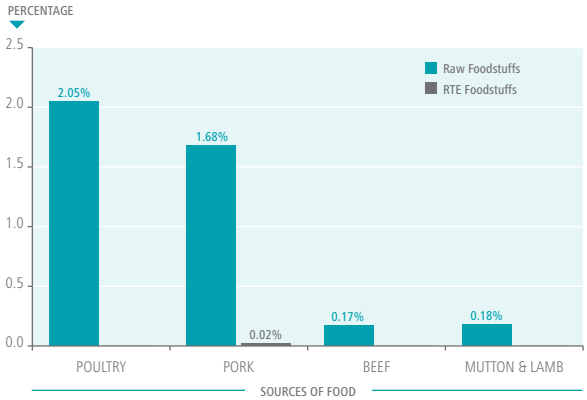
FOOD TYPE	SAMPLING SITE	RTE STATUS	TESTED	POSITIVE
FRESH MEAT				
Poultry	Processing	Raw	5,434	115
	Retail	Raw	1	0
Pork	Processing	Raw	2,690	112
Beef	Processing	Raw	18,169	37
	Retail	Raw	1	0
Mutton and Lamb	Processing	Raw	1,006	3
Meat products unspecified	Processing	Raw	2,950	21
MEAT PRODUCTS				
Poultry	Processing	RTE	9,807	0
		Raw	1,050	18
	Retail	RTE	542	0
		Raw	5	0
		NS	1,029	0
Poultry	Processing	RTE	14,807	3
		Raw	6,348	40
	Retail	RTE	343	0
		Raw	4	0
		NS	688	0
Beef	Processing	RTE	6,726	0
		Raw	9,611	9
	Retail	RTE	207	0
		Raw	4	0
		NS	291	0

FOOD TYPE	SAMPLING SITE	RTE STATUS	TESTED	POSITIVE
Mutton and Lamb	Processing	RTE	158	0
		Raw	1,230	1
	Retail	RTE	22	0
		NS	34	0
Meat products unspecified	Processing	RTE	2,204	0
		Raw	1,206	1
	Retail	RTE	103	0
		Raw	9	0
		NS	263	0
Products of animal origin	Processing	NS	896	0
	Retail	NS	1	0
Overall Total			87,839	360 (0.41%)
consisting of				
Total RTE			34,919	3 (0.01%)
Total Raw			49,718	357 (0.72%)
Total NS			3,202	0 (0%)

(Source: CVRL, CMCL, DAFF & OFML)
- RTE: Ready-to-Eat, NS: Not Specified

A more detailed analysis of the contamination of *Salmonella* spp. on raw meat reveals a 2.05% level on raw poultry and a 1.68% level on raw pork meat (Figure 2.7). These levels of contamination were reduced to 0% and 0.02% on the respective ready-to-eat food products tested. The percentage of raw beef meat (0.17%), and raw mutton and lamb samples (0.18%) contaminated with *Salmonella* spp. was found to be low, and no *Salmonella* spp. was detected in beef, and mutton and lamb ready-to-eat products tested.

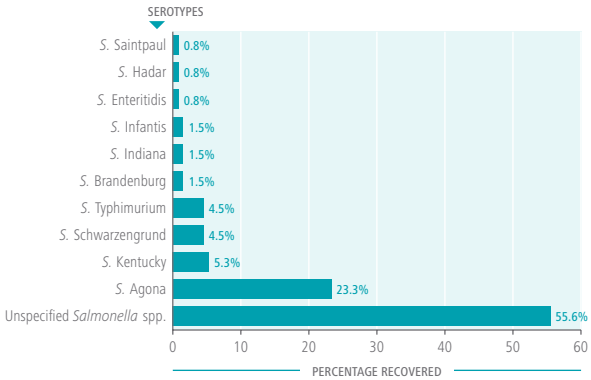
Figure 2.7. Percentage of *Salmonella* spp. isolated from samples of poultry, pork, beef, and mutton and lamb foodstuffs by ready-to-eat status (n=338), 2009



(Source: CVRL, CMCL, DAFF & OFML)
RTE: Ready-to-eat, NS: Not Specified

The 2.05% of raw poultry meat confirmed positive for *Salmonella* spp. (Figure 2.7.), included: unspecified *Salmonella* spp. (n=74), S. Agona (n=31), *S*. Kentucky (n=7), *S*. Schwarzengrund (n=6), *S*. Typhimurium (n=6, all of which were phage typed as DT120) and 8 other species (Figure 2.8). One isolate of *S*. Enteritidis was recovered from a raw poultry meat sample and phage typed as PT4. While 133 positive isolates of *Salmonella* spp. were recovered from raw poultry meat in 2009, no isolates were recovered from any ready-to-eat poultry meat sample tested in this year. It is interesting to note that the percentage of *S*. Agona increased from 2008 (6%) to 2009 (23.3%), while there was marked decrease in *S*. Kentucky between 2008 (64%) and 2009 (5.3%).

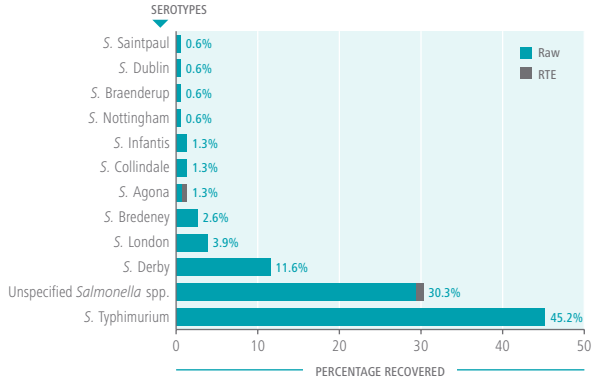
Figure 2.8. Serotypes isolated from raw poultry (n=133), 2009



(Source: CVRL, CMCL, DAFF & OFML)

Of the 155 isolates recovered from pork meat in 2009, the predominant serotype was *S*. Typhimurium (n=70). However, no strains of this serotype were isolated from RTE pork meat tested in 2009 (Figure 2.9.). Sixty seven of these *S*. Typhimurium isolates recovered were phage typed and identified as; DT104b (n=18), DT193 (n=18), U311 (n=9), DT104 (n=5), U288 (n=5), DT12 (n=3), U302 (n=3), U322 (n=3), RNDC (n=1), DT35 (n=1) and DT208 (n=1). Unspecified *Salmonella* spp. were the second most common (45 isolates from raw and 2 isolates from ready-to-eat pork), followed by *S*. Derby (18 isolates from raw pork). Two samples were also reported positive for *S*. Agona, 1 of which was raw and the other ready-to-eat.

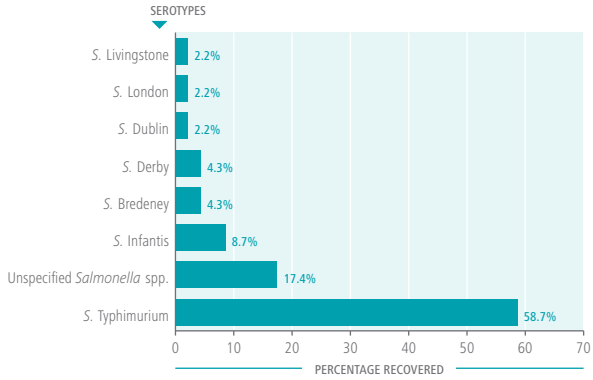
Figure 2.9. Serotypes Isolated from raw and ready-to-eat pork (n=155), 2009



(Source: CVRL, CMCL, DAFF & OFML)
RTE: Ready-to-Eat

Similar to pork, *S*. Typhimurium was the most predominant serotype (n=27) isolated from beef (Figure 2.10.). Twenty three of these *S*. Typhimurium isolates were phage typed and identified as; DT193 (n=6), DT104 (n=5), U322 (n=3), DT104b (n=2), U302 (n=2), U311 (n=2), U288 (n=1), DT12 (n=1) and DT120 (n=1). Unspecified *Salmonella* spp. (n=8), *S*. Infantis (n=4), *S*. Bredeney (n=2) and *S*. Derby (n=2) were also recovered from raw beef in 2009. While 46 positive isolates of *Salmonella* spp. were found on raw beef, no isolates were recovered from any ready-to-eat beef meat sampled in this year.

Figure 2.10. Serotypes isolated from raw beef (n=46), 2009



(Source: CVRL, CMCL, DAFF & OFML)

Four isolates of *Salmonella* spp. were isolated from raw mutton and lamb samples tested in 2009, 3 of which were *Salmonella* unspecified and 1 was *S.* Dublin.

A total 47,039 non-meat food products were tested for *Salmonella* spp. in 2009; 0.02% (n=11) of which, were confirmed positive for this pathogen (Table 2.4.). The foodstuffs tested included; dairy products (such as milk, cheese, butter, cream, and desserts), eggs and egg products, fish and fish products, fruit and vegetables and 'others foods'. *Salmonella* spp. were recovered from 1 raw food sample (0.07%) and 10 not specified processed and prepared foods (0.02%) in 2009, but not from any ready-to-eat products tested.

Table 2.4. Number of samples tested and number of samples positive for *Salmonella* spp. in non-meat food by food type and sampling site, 2009

FOOD TYPE	SAMPLING SITE	RTE STATUS	TESTED	POSITIVE
MILK & DAIRY PRODUCTS				
Milk	Processing	RTE	488	0
		Raw	38	0
	Retail	RTE	4	0
		Raw	3	0
		NS	13	0
Milk and whey powder	Processing	NS	6,178	0
Cheese unspecified source	Retail	RTE	204	0
Cheese soft & semi-soft	Retail	RTE	11	0
Cheese from raw or low heat-treated milk	Processing	RTE	512	0
Curd	Processing	NS	5	0
	Retail	RTE	3	0
Butter from pasteurised milk	Processing	RTE	10	0
Butter from raw or low heat-treated milk	Processing	NS	20	0
Butter unspecified	Retail	RTE	4	0
Cream	Processing	NS	5	0
	Retail	RTE	56	0
Desserts & ice-cream	Processing	NS	466	0
	Retail	RTE	227	0
Unspecified milk products	Processing	NS	8,955	0
	Retail	RTE	24	0

FOOD TYPE	SAMPLING SITE	RTE STATUS	TESTED	POSITIVE
EGGS				
Table eggs or egg products	Processing	NS	1,612	0
	Retail	NS	28	0
		Raw	399	0
FISH				
Fish and fishery products (including crustaceans and molluscs)	Processing	RTE	943	0
		Raw	966	1
		NS	162	0
	Retail	RTE	85	0
		Raw	17	0
		NS	323	0
FRUIT & VEGETABLES				
Pre-cut & products	Retail	NS	161	0
Unprepared	Retail	NS	177	0
Unspecified	Processing	NS	1,545	0
OTHER FOODS				
Juices & drinks	Retail	RTE	62	0
Bakery products	Retail	RTE	438	0
Cereals & meal	Retail	NS	208	0
Confectionary, nut products, cocoa, tea & coffee	Retail	RTE	87	0
Oil, spices & herbs	Retail	RTE	29	0
Soups, sauces and dressings	Retail	RTE	432	0
Infant formula & PARNUTS	Processing	NS	435	0
	Retail	RTE	21	0
Other processed food & prepared dishes	Processing	NS	19,363	9
	Retail	NS	2,320	1
Overall Total			**47,039**	**11 (0.02%)**
consisting of				
Total RTE			**3,128**	**0 (0%)**
Total Raw			**1,423**	**1 (0.07%)**
Total NS			**42,488**	**10 (0.02%)**

(Source: CVRL, DAFF & OFMLS)
– Unless otherwise specified, milk source was cow, goat or sheep
– PARNUTS: Foodstuffs intended for special nutritional uses
– RTE: Ready-to-Eat, NS: Not Specified

Salmonella spp. unspecified was recovered from 9 processed and prepared foods, and 1 raw fish sample. In addition, 1 processed and prepared food sample was positive for *S.* Typhimurium, U322.

ANIMALS

Salmonella spp. was not detected in any chicken breeding flocks (grandparent or parent), or broilers before slaughter in 2009 (Table 2.5). However, a pooled sample (faeces, boot cover and dust) from 1 laying hen flock, tested positive for *S.* Dublin in this year. *Salmonella* spp. was also recovered from hatchery samples of 2 breeding duck flocks (both *S.* Schwarzengrund), but no *Salmonella* spp. were recovered from any hatchery samples of turkey flocks tested in this year.

Table 2.5 *Salmonella* spp. in breeding and commercial poultry flocks, 2009

FLOCK TYPE	AGE/STAGE	TESTED	POSITIVE
GALLUS GALLUS			
Broiler breeding	Grandparent & Parent flocks	129	0
Commercial layers	Laying hens during production period	375	1
Broilers before slaughter		665	0
NON-*GALLUS GALLUS*			
Duck flocks	Breeding flocks	9	2
Turkey flocks	Meat production flocks	5	0
Total		1,183	3 (0.25%)

(Source: DAFF)

FEED

Salmonella spp. were not detected in any of the 61 samples of feed material tested in 2009 (Table 2.6), compared to 0.91% of those tested in 2008.

Table 2.6. *Salmonella* spp. in animal feed materials, 2009

TYPE OF FEED MATERIAL	TESTED	POSITIVE
FEED MATERIAL OF ANIMAL ORIGIN		
Feed material containing fish meal	2	0
FEED MATERIAL OF VEGETABLE ORIGIN		
Cereals	57	0
Oilseeds	28	1
Other seeds & fruits	1	0
Other plants	2	0
Forages and roughages	1	0
COMPOUND FEED		
Compound feed for laying hens	8	0
Compound feed for broilers	7	0
Compound feed for poultry (non-specified)	4	0
Compound feed for cattle	34	0
Compound feed for pigs	14	1
Compound feed for sheep	2	0
Compound feed for horses	1	0
Total	161	0

(Source: DAFF)

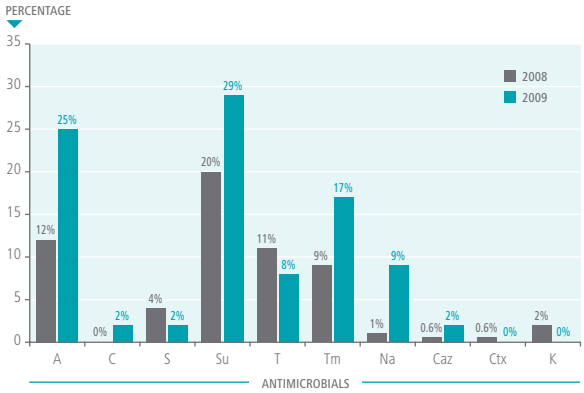
ANTIMICROBIAL RESISTANCE IN *SALMONELLA* SPP. ISOLATED FROM FOOD PRODUCING ANIMALS AND FOODS OF ANIMAL ORIGIN

The data used to study antimicrobial resistance in this update were sourced from the NSRL who tests the susceptibility of human, animal and food isolates against a range of clinical and veterinary significant antimicrobials. This allows for comparisons to be made easily across these categories, giving an overview of emerging resistance in distinct areas for which antimicrobial use would vary. In 2009, 366 human and 368 non-human isolates were received and tested by the NSRL. In addition, another 518 *Salmonella* spp. were tested by the NRL *Salmonella* (food, feed and animal health) and these results are presented in detail in their Annual Report on Antimicrobial Resistance (DAFF, 2009).

ANTIMICROBIAL RESISTANCE IN *SALMONELLA* SPP. ASSOCIATED WITH POULTRY (ANIMAL AND FOOD SAMPLES)

Only 1 *S*. Typhimurium isolate (DT30) associated with poultry was tested for antimicrobial resistance in 2009 and this isolate was reported as fully susceptible to the range of antimicrobials tested. Antimicrobial susceptibility data were available for 65 poultry associated non-Typhimurium isolates in this year and the results are presented in Figure 2.11 and Table 2.7. A marked increase in resistance was reported for ampicillin, chloramphenicol, sulphonamides, trimethoprim and nalidixic acid in 2009. While a slight increase in resistance to ceftazidime was noted, resistance to cefotaxime was not reported in *Salmonella* spp. associated with poultry (or other food producing animals) in this year.

Figure 2.11 Antimicrobial resistance profiles of non-Typhimurium *Salmonella* spp. associated with poultry meat*, in 2008 (n=363) and 2009 (n=65)



(Source: NSRL)

* Isolated from poultry, and swabs from broiler house

– Ampicillin (A); Chloramphenicol (C); Streptomycin (S); Sulphonamides (Su); Tetracycline (T); Trimethoprim (Tm); Nalidixic Acid (Na), Ceftazidime (Caz); Cefotaxime (Ctx) and Kanamycin (K)

In 2009, 18.5% of non-Typhimurium *Salmonella* spp. associated with poultry were determined as MAR, with 1 isolate (*S*. Kentucky) expressing resistance to 5 antimicrobials (Table 2.7.). This is compared to 10.5% MAR non-Typhimurium strains associated with poultry in 2008, with 1 isolate (*S*. Kentucky) expressing resistance to 6 antimicrobials.

Table 2.7 Antimicrobial resistance profiles of non-Typhimurium *Salmonella* spp. associated with poultry referred to the NSRL (n=65), 2009

SALMONELLA SPP.	NO. OF ISOLATES	RESISTANCE PROFILE
S. Kentucky	**1**	**ACSuTCaz**
S. Kentucky	**1**	**ASuTTm**
S. Mbandaka	**1**	**SSuTTm**
S. Kentucky	**8**	**ASuTm**
S. Infantis	**1**	**ASuTm**
S. Kentucky	5	ASu
S. Indiana	2	SuT
S. Seftenberg	4	Na
S. Enteritidis	1	Na
S. Virchow	1	Na
Others	*40*	*Susceptible*

Source: NSRL

* Isolated from poultry (including intestinal tissue, bladder meat, neck flaps, fluff), broiler dust and boot swabs.

– Ampicillin (A); Chloramphenicol (C); Streptomycin (S); Sulphonamides (Su); Tetracycline (T); Trimethoprim (Tm); Nalidixic acid (Na), and Ceftazidime (Caz)

– Isolates in bold determined as multi-antimicrobial resistant (MAR)

ANTIMICROBIAL RESISTANCE IN *SALMONELLA* SPP. ASSOCIATED WITH PIGS (ANIMAL AND FOOD SAMPLES)

The antimicrobial susceptibility profiles for 2009 showed a marked increase in resistance to ampicillin, chloramphenicol, streptomycin, sulphonamides, tetracycline and trimethoprim in *S.* Typhimurium associated with pigs, compared to 2008 (Figure 2.12). This increase was mirrored by a similarly large increase in resistance to these antimicrobials in non-Typhimurium *Salmonella* spp. However, the sample numbers for non-Typhimurium *Salmonella* spp. associated with pigs are quite low (n=18) and therefore may not be representative (Figure 2.13). Resistance to nalidixic acid and gentamycin were observed in *S.* Typhimurium, but not in any of the non-Typhimurium *Salmonella* spp. isolates examined. In contrast to data for 2008, no kanamycin resistance was observed in any *Salmonella* spp. associated with pigs tested in 2009.

Figure 2.12. Antimicrobial resistance profiles of *S.* Typhimurium isolates associated with pigs*, in 2008 (n=169) and 2009 (n=109)

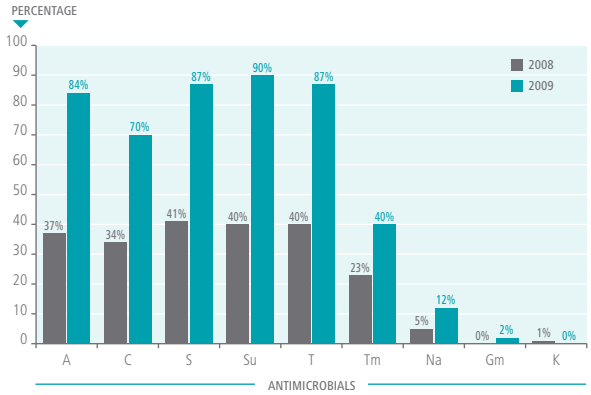
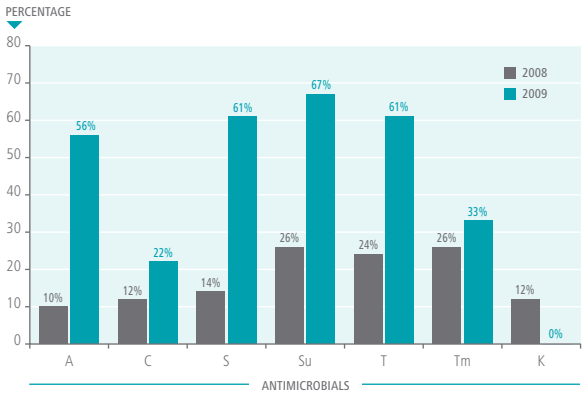


Figure 2.13. Antimicrobial resistance profiles of non-Typhimurium isolates associated with pigs*, in 2008 (n=50) and 2009 (n=18)



Source: NSRL

* Isolates were recovered from pig meat and offal (including shoulder, foot, ears, organs, heart, liver, lymph nodes, belly and caeca), carcass swabs, pork products (including hickory gammon steaks and sausages) pig faeces and boar faeces

– Ampicillin (A); Chloramphenicol (C); Streptomycin (S); Sulphonamides (Su); Tetracycline (T); Trimethoprim (Tm); Nalidixic acid (Na); Gentamycin (Gm) and Kanamycin (K)

In 2009, 66.7% of non-Typhimurium *Salmonella* spp. associated with pigs where determined as MAR, with 1 isolate (serotype unnamed) expressing resistance to 6 antimicrobials (Table 2.8.). This is compared to 36% MAR non-Typhimurium strains associated with pigs in 2008, with 1 isolate (serotype unnamed) expressing resistance to 7 antimicrobials.

Table 2.8 Antimicrobial resistance profiles of non-Typhimurium *Salmonella* spp. associated with pigs referred to the NSRL (n=18), 2009

SALMONELLA SPP.	NO. OF ISOLATES	RESISTANCE PROFILE
Unnamed	**2**	**ACSSuTTm**
Unnamed	**1**	**ACSSuTm**
S. Muenchen	**2**	**ASSuTTm**
Unnamed	**1**	**ACSSuT**
S. Derby	**1**	**ASuTTm**
Unnamed	**3**	**ASSuT**
S. Derby	**2**	**SSuT**
Others	*6*	*Susceptible*

* Isolated from pork meat (including shoulder, ears and organs), carcass swabs and porcine & boar faeces

Ampicillin (A); Chloramphenicol (C); Streptomycin (S); Sulphonamides (Su); Tetracycline (T) and Trimethoprim (Tm)

\- Isolates in bold determined as multi-antimicrobial resistant (MAR)

ANTIMICROBIAL RESISTANCE IN *SALMONELLA* SPP. ASSOCIATED WITH BOVINES (ANIMAL AND FOOD SAMPLES)

Antimicrobial susceptibility data were available for 19 bovine *S.* Typhimurium for 2009 (n=19). Results showed a higher level of resistance to ACSSuT and Tm, than the figures for 2008 (n=10). However, these data may not be representative given the low number of isolates involved. Five isolates of non-Typhimurium *Salmonella* spp. were also examined, 1 of which (*S.* Derby) was found to be MAR (SSuT).

ANTIMICROBIAL RESISTANCE IN *SALMONELLA* SPP. ASSOCIATED WITH OVINES (SHEEP) (ANIMAL AND FOOD SAMPLES)

Only 1 *Salmonella* spp. isolate associated with sheep (*S.* Dublin) was examined for susceptibility in 2009, and this isolate was reported to be fully susceptible to the range of antimicrobials tested. Antimicrobial susceptibility testing was not conducted on any *Salmonella* spp. associated with ovines in 2008.

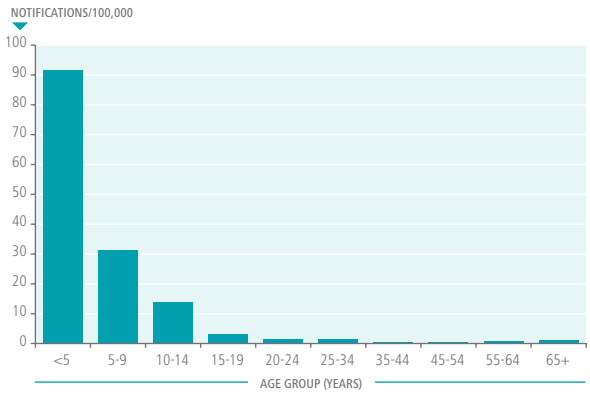
3. CRYPTOSPORIDIOSIS

HUMAN

In 2009, 445 cases of cryptosporidiosis were notified in Ireland, a CIR of 10.5 per 100,000 population. This was a 7% increase on the number of cases notified in 2008 (n=416). In 2008, (the most recent year for which data are available), the European Centre for Disease Prevention and Control (ECDC) reported an overall CIR of 2.4 per 100,000 population in the EU, with Ireland having the highest rate of the disease among reporting countries at that time (9.4 per 100,000 population, ECDC, 2010).

The highest reported incidence rate of cryptosporidiosis in the population tends to be in children under the age of 5 with approximately 90 notifications per 100,000 in this population in 2009 (Figure 3.1.).

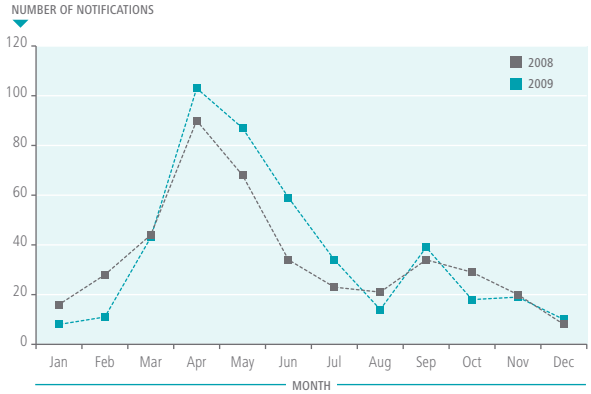
Figure 3.1. Age-specific incidence rate of cryptosporidiosis, 2009



(Source: HPSC)

A large increase in the number of cases of cryptosporidiosis tends to occurs in spring and in early summer, a trend that has been observed since 2004. Consistent with previous years, a similar peak in the reported number of cases occurred in 2009 (Figure 3.2.).

Figure 3.2. Seasonal Distribution of cryptosporidiosis notifications, 2008 versus 2009



(Source: HPSC)

Seventeen percent of human isolates of Cryptosporidium in Ireland were referred for speciation to the UK Cryptosporidium Reference Unit by a small number of hospital laboratories in 2009. Of these, *C. parvum* was the most common species identified (15.3%), followed by *C. hominis* (1.6%). Six outbreaks of cryptosporidiosis were reported in Ireland during this year; 5 family outbreaks and 1 general outbreak, resulting in 17 infected individuals (Table 3.1).

Table 3.1. Cryptosporidiosis outbreaks, 2009				
YEAR	MONTH	MODE OF TRANSMISSION	OUTBREAK TYPE	NO. ILL
2009	March	Person-to-Person	Family	2
	April	Animal Contact	Family	3
	April	Unknown	Family	3
	May	Person-to-Person	General	3
	June	Unknown	Family	2
	June	Person-to-Person	Family	4
	Total			**17**

(Source: HPSC)

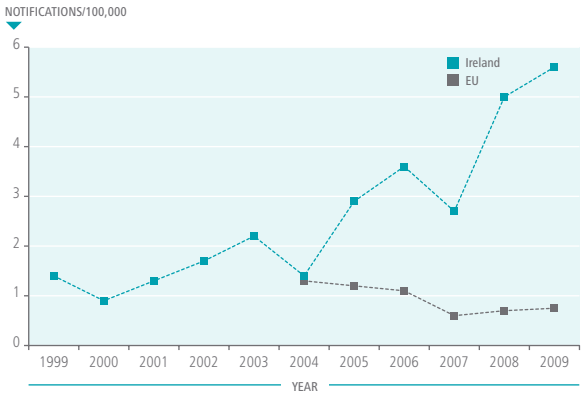
4. VEROTOXIGENIC *ESCHERICHIA COLI* (VTEC) INFECTION

HUMAN

In 2009, 238 confirmed VTEC cases were notified to the HPSC, a CIR of 5.6 per 100,000 population. This is the highest number of cases reported since VTEC data collection began in 1999 (Figure 4.1). If the number of confirmed cases for 2009 is compared with 2008 (213 confirmed), then 2009 represents a 12% increase in the number of confirmed cases notified in 2008 (HPSC, 2010).

Ireland has one of the highest incidence rates of VTEC associated cases in Europe. In 2008, Ireland's CIR was well above the European average CIR of 0.75 per 100,000 (based on notifications from the 27 Member States, with the exception of Portugal and the Czech Republic, who do not have VTEC surveillance systems in place) (EFSA 2011a).

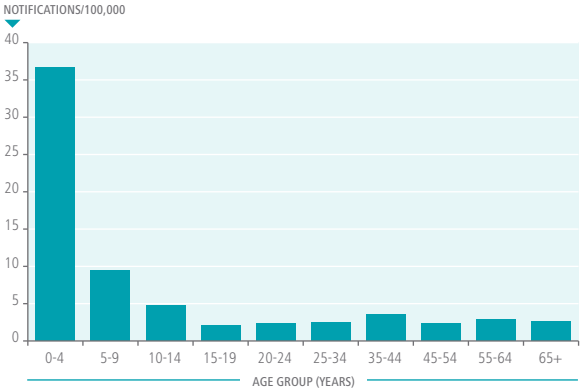
Figure 4.1. Annual crude incidence rate confirmed VTEC notifications, Ireland 1999-2009 and EU 2004-2009 (n=163)



(Source: DML-PHL, HPSC & EFSA)

Similar to previous years, the reported incidence of the disease was highest among young children (Figure 4.2.).

Figure 4.2. Age-specific incidence rate of confirmed VTEC notifications, 2009



(Source: HPSC, DML-PHL)

Sixty nine percent of isolates notified in 2009 were VTEC O157. The verotoxin profiles of VTEC O157 strains in 2009 were similar to those reported in previous years (Table 4.1.). Eighty nine percent of VTEC O157 strains carried the *vt2* gene only, while 11% carried both for *vt1* and *vt2* genes. In contrast, 38% of non-O157 VTEC isolates carried the genes for *vt1* only, 26% for *vt2* only, and 36% for *vt1* and *vt2*.

Table 4.1. Verotoxin results of confirmed and probable VTEC isolates, 2009					
SEROGROUP	*vt1*	*vt2*	*vt1 & vt2*	NOT REPORTED	TOTAL
O157	0	148	18	1	167
O26	19	3	23	0	45
O ungroupable	2	7	4	0	13
O145	0	4	0	0	4
O103	3	0	0	0	3
O105	0	3	0	0	3
O128	1	0	0	0	1
O21	0	1	0	0	1
O3	1	0	0	0	1
O5	1	0	0	0	1
O55	1	0	0	0	1
O28	0	1	0	0	1
Total	**28**	**167**	**45**	**1**	**241***

(Source: HPSC, DML-PHL)

* Includes 238 confirmed cases and 3 probable

Forty two outbreaks were reported in 2009, involving 115 of the 238 confirmed cases notified (Table 4.2.). Twenty seven outbreaks were caused by VTEC O157, 8 by VTEC O26, 3 by non-O157 VTEC and 4 by a mixture of VTEC strains. Person-to-person transmission was suspected in 16 VTEC outbreaks in which 35 persons were reported ill. Drinking water (untreated/inadequately treated private water supplies) was believed to have contributed to 12 outbreaks, making waterborne transmission the second most common route of infection reported in this year. In the outbreaks where foodborne transmission was suspected, no definitive evidence was reported implicating any specific food.

Table 4.2. VTEC outbreaks, 2009			
SUSPECTED MODE OF TRANSMISSION	OUTBREAKS	NO. ILL	CASES CONFIRMED
Animal contact	1	4	4
Foodborne	1	1	3
Foodborne/waterborne	2	6	6
Person-to-person	11	26	32
Person-to-person and foodborne	2	4	4
Person-to-person and waterborne	3	5	9
Waterborne	7	14	19
Unknown/Unspecified	15	34	38
Total	**42**	**94**	**115**

(Source: HPSC)

Six outbreaks were defined as general outbreaks and 36 as family outbreaks. Two general outbreaks occurred in child minding facilities and 1 general outbreak was linked to a food outlet. The remaining 3 general outbreaks occurred in private houses.

FOOD

The zoonoses data shows that a total of 224 food products and 117 carcass swabs were tested for verotoxigenic *Escherichia coli* (VTEC) in Ireland in 2009. Out of these, 2 raw food samples (2.30%); beef and mutton (or lamb), and 4 bovine carcass swabs tested positive (3.42%) for this pathogen (Table 4.3.). The positive raw beef sample was confirmed as being contaminated with *E. coli* O146 and the raw mutton (or lamb) with *E. coli* O157. The 4 positive carcass swabs were also found to be positive for *E. coli* O157.

At present, there are no microbiological standards for VTEC specified in Commission Regulation (EC) No 2073/2005. This is due to a scientific opinion on VTEC in foodstuffs from 2003 given by the scientific committee on veterinary measures relating to public health (SCVPH), which concluded that applying an end-product microbiological standard for VTEC O157 is unlikely to deliver meaningful reductions in the associated risk to consumers. However, microbiological guidelines aimed at reducing faecal contamination along the food chain can contribute to a reduction in public health risks, including VTEC (Regulation (EC) No 2073/2005). This is also in agreement with the EFSA scientific opinion on VTEC (EFSA, 2007), in which it was concluded that good hygiene practices at abattoirs and at processing plants, including monitoring for microbiological indicators (*Enterobacteriaceae* and generic *E. coli*), are the most effective methods for reducing the public health risks associated with VTEC related infections.

While no specific criteria are currently in-place, if a ready-to-eat food is confirmed positive for VTEC, the batch should be withdrawn/recalled from the market in accordance with Article 19 of Regulation (EC) No 178/2002.

Table 4.3. VTEC in foods and drinks tested by food type and sampling site, 2009

FOOD TYPE	SAMPLING SITE	RTE STATUS	TESTED	POSITIVE
FRESH MEAT				
Poultry	Retail	Raw	1	0
MEAT PRODUCTS				
Beef carcass swab	Processing	Raw	23	0
			86	4
	Retail	RTE	4	0
		Raw	7	1
		NS	4	0
Pork	Retail	RTE	6	0
		Raw	4	0
		NS	5	0
Poultry	Retail	RTE	21	0
		NS	10	0
Mutton and lamb carcass swab	Processing	Raw	5	1
		Raw	31	0
	Retail	RTE	1	0
		Raw	1	0
Unspecified meat and other meat	Retail	RTE	7	0
		Raw	6	0
		NS	7	0

FOOD TYPE	SAMPLING SITE	RTE STATUS	TESTED	POSITIVE
OTHER FOODS				
Milk and milk products	Retail	RTE	24	0
		Raw	15	0
		NS	1	0
Fish and fishery products	Retail	Raw	1	0
		NS	2	0
Fruit and vegetables	Retail	Raw	20	0
Fruit and vegetable juices	Retail	RTE	1	0
		NS	9	0
Other food	Retail	RTE	9	0
		Raw	4	0
		NS	26	0
Overall Total			**341**	**6 (1.76%)**
consisting of				
Total RTE			**73**	**0**
Total Raw			**87**	**2 (2.30%)**
Total NS			**64**	**0**
Carcass Swabs			**117**	**4 (3.42%)**

(Source: DAFF & OFMLS)

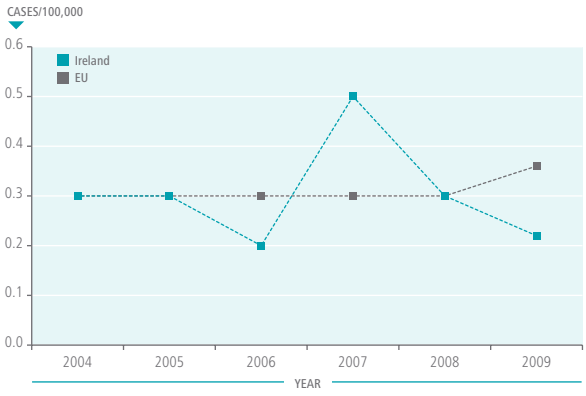
RTE: Ready-to-Eat, NS: Not Specified

5. LISTERIOSIS

HUMAN

In 2009, 10 cases of human listeriosis were notified to the HPSC, a CIR of 0.22 per 100,000 population. This is a slight reduction on the 13 human listeriosis cases notified in 2008, a CIR of 0.3 per 100,000 population (Figure 5.1). While the CIR for Ireland in 2008 was the same as the European average, the incidence rates for 2009 showed a slight decrease in the number of cases in Ireland and an increase in the European CIR (0.36, based on notifications from the 27 Member States, with the exception of Portugal, who does not have a listeriosis surveillance systems in place) (HPSC, 2010, EFSA 2011a).

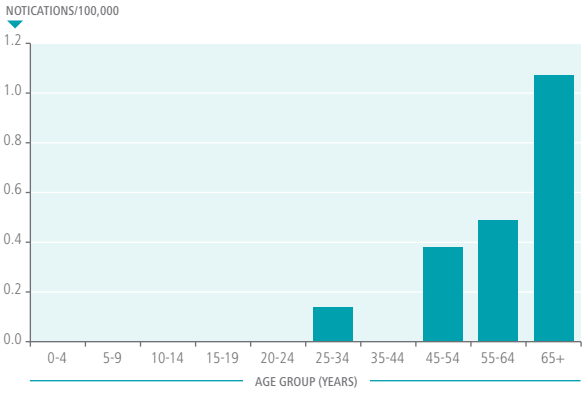
Figure 5.1. EU and Irish human listeriosis incidence rates, 2004-2009



(Source: HPSC & EFSA)

One pregnant woman (but no neonates) was among the 10 cases of human listeriosis notified in 2009 (Figure 5.2.). The remaining 9 cases of infection consisted of 5 elderly individuals (>65 years), 2 of whom reported underlying illness; a possible predisposing factor to listeriosis. Three of the cases under the age of 65 also reported underlying illness while no information was available on the 10th case. No deaths were associated with listeriosis in this year.

Figure 5.2. Age-specific incidence rate of listeriosis notifications, Ireland 2009



(Source: HPSC)

In 2009, 8 human *Listeria* spp. isolates were received by the NSRL (who also provide a typing service for *Listeria* isolates) and were serotyped as either serotype 1/2 or 4b (Table 5.1.)

Table 5.1. Listeriosis notifications by case type and serotype, 2009

CASE TYPE	SEROTYPE 1/2	SEROTYPE 4B	NOT REFERRED FOR SEROTYPING	TOTAL
Adult or juvenile	4	3	2	9
Pregnancy-related	0	1	0	1
Neonatal	0	0	0	0
Total	**4**	**4**	**2**	**10**

(Source: HPSC & NSRL)

FOOD

Human listeriosis is almost exclusively caused by *Listeria monocytogenes*, an illness frequently associated with the consumption of cold stored ready-to-eat foods which support the growth of these bacteria. The zoonoses data for 2009 reveal that 7,588 food samples were tested using the detection method (presence or absence) and 9,847 food samples were tested using the enumeration method (level of cfu per/g), in 2009 (Table 5.2). *L. monocytogenes* was detected in 1.40% of raw food and 1.14% of ready-to-eat food products examined in this year. The enumeration test revealed that 2 ready-to-eat products (1 cheese and 1 beef sample, 0.09%) and 2 food products for which the ready-to-eat status was not specified (processed food products and prepared dishes, 0.03%) were reported to have levels of *L. monocytogenes* greater than 100 cfu/g. Under European legislation (Regulation (EC) No 2073/2005 on the microbiological criteria for foodstuffs), *L. monocytogenes* must be absent in 25g of ready-to-eat foods intended for infants or special medical purposes. For all other ready-to-eat foods placed on the market, *L. monocytogenes* must not be present at levels greater than 100cfu/g during their shelf- life.

A FSAI/HSE survey on the microbiological safety of pre-packaged sandwiches conducted in 2009 (FSAI 2009b) found that 0.2% of sandwiches tested were contaminated with *L. monocytogenes*. A second FSAI/HSE survey conducted in 2009, examined the presence of *L. monocytogenes* on cooked meat slicers in retail and catering premises (FSAI 2009a), and found that 0.23% of slicers tested were contaminated. These studies highlight the importance of appropriate refrigeration of ready-to-eat foods, and the need for adequate cleaning and disinfection of food processing equipment used to prepare ready-to-eat food. A recent EFSA report on *Listeria* spp. in ready-to-eat foods, advised the food industry that packaging and preparation practices (such as the slicing of ready-to-eat meat products), general industrial good hygiene, adequate refrigeration and the education and training of food handlers, are key areas in reducing the risk of human infection from *Listeria* spp. (EFSA 2008).

Table 5.2. *L. monocytogenes* in foods at retail and processing level, 2009

			DETECTION METHOD		ENUMERATION METHOD	
FOOD TYPE	SAMPLING SITE	RTE STATUS	TESTED	POSITIVE	TESTED	> 100 CFI/G*
Beef	Processing	RTE	23	0	0	0
		NS	23	2	0	0
	Retail	RTE	57	6	197	1
		NS	21	0	282	0
Pork	Processing	RTE	111	0	0	0
		Raw	2	0	0	0
		NS	11	1	0	0
	Retail	RTE	127	4	333	0
		Raw	1	0	3	0
		NS	125	6	694	0
Poultry	Processing	RTE	159	0	0	0
		NS	15	0	0	0
	Retail	RTE	138	6	511	0
		Raw	0	0	3	0
		NS	70	1	1,012	0
Mutton and Lamb	Retail	RTE	3	0	21	0
		NS	4	0	32	0
Unspecified & mixed meats	Processing	RTE	18	0	0	0
		NS	2	0	0	0
	Retail	RTE	33	0	97	0
		Raw	0	0	1	0
		NS	38	0	249	0
Milk	Processing	RTE	224	0	0	0
		Raq	28	0	0	0
	Retail	RTE	3	0	4	0
		Raw	0	0	2	0
		NS	1	0	13	0
Cheese	Processing	RTE	815	0	0	0
		Raw/LHT	517	8	0	0
		NS	5	0	0	0
	Retail	RTE	50	1	218	1
Other dairy products	Processing	RTE	706	1	0	0
		Raw/LHT	20	0	0	0
		NS	329	0	310	0
	Retail	RTE	114	0	282	0
		NS	12	0	24	0

FOOD TYPE	SAMPLING SITE	RTE STATUS	DETECTION METHOD TESTED	DETECTION METHOD POSITIVE	ENUMERATION METHOD TESTED	ENUMERATION METHOD > 100 CFI/G*
Eggs	Retail	Raw	0	0	3	0
Egg products	Retail	NS	24	0	391	0
Smoked fish	Processing	RTE	117	12	0	0
Other fishery & seafood products	Processing	RTE	1	0	0	0
		NS	138	5	1	0
	Retail	RTE	26	1	76	0
		Raw	5	0	8	0
		NS	20	0	321	0
Soup, sauces & dressings	Retail	RTE	52	1	403	0
Cereals & meals	Retail	RTE	21	0	198	0
Fruit, vegetables & juices	Retail	NS	49	0	322	0
Processed food products & prepared dishes	Retail	NS	297	6	3,324	2
Infant formula	Processing	NS	160	0	0	0
	Retail	NS	3	0	3	0
Swabs (National survey)	Retail	NS	2,728	7	0	0
Other foods	Retail	NS	142	0	509	0
Overall Total			**7,588**	**68 (0.90%)**	**9,847**	**4 (0.04%)**
consisting of						
Total RTE *(Percent Positive)*			**2,798**	**32** *(1.14%)*	**2,340**	**2** *(0.09%)*
Total Raw *(Percent Positive)*			**573**	**8** *(1.40%)*	**20**	**0** *(0%)*
Total NS *(Percent Positive)*			**4,217**	**28** *(0.66%)*	**7,487**	**2** *(0.03%)*

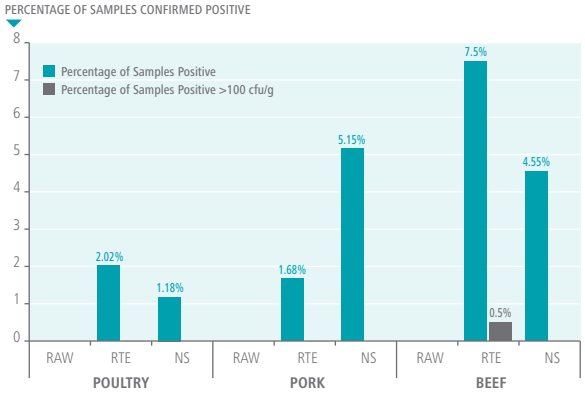
(Source: DAFF, DCMNR & OFMLs)

*The number of samples tested for *L. monocytogenes* using both the detection method and the enumeration method is not known. For this reason the relationship between the samples confirmed positive using either method is unknown.

RTE: Ready-to-Eat, NS: Not Specified

L. monocytogenes was detected in ready-to-eat poultry (2.02%), ready-to-eat pork (1.68%) and ready-to-eat beef (7.5%), but not on the small number of raw meat samples tested in 2009 (Figure 5.3.). Of the meat samples tested using the enumeration technique; only 1 ready-to-eat meat sample (beef, 0.5%) was found to have a concentration of *L. monocytogenes* greater than 100 cfu/g. *L. monocytogenes* was not isolated from any mutton or lamb samples tested in this year.

Figure 5.3. Percentage of *L. monocytogenes* recovered from raw, non-specified and ready-to-eat samples (retail & processing) of poultry, pork and beef foodstuffs, 2009



(Source: DAFF, DCMNR & OFML)

- The number of samples tested for *L. monocytogenes* using both the detection method and the enumeration method is not known. For this reason no correlation can be made between results obtained using both methods
- Mutton and lamb samples were omitted due to a reported absence of *L. monocytogenes* in all samples tested in this year
- RTE: Ready-to-Eat, NS: Not Specified

6. TUBERCULOSIS

HUMAN

A total of 479 human tuberculosis (TB) cases were provisionally notified in 2009, and 7 out of the 332 culture confirmed cases were bovine TB (caused by *Mycobacterium bovis*) (Table 6.1.). This equates to a CIR of 0.2 per 100,000 population of *M. bovis* associated TB infection in 2009, compared to 0.3 in 2008. TB cases for which *M. bovis* was reported to be the aetiological agent have remained relatively stable since 1999 (0.1-0.3 per 100,000 population) (HPSC, 2010, EFSA 2011a).

Table 6.1. Human TB notifications, 2000-2009

	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009*
TB cases notified	469	395	381	408	407	431	450	465	480	468	479
Cases culture confirmed	253	227	212	239	255	273	280	315	313	306	332
Culture confirmed as:											
M. tuberculosis	242	222	204	233	250	268	275	309	305	294	324
M. bovis	11	2	7	5	4	5	4	5	6	12	7
M. africanum	0	3	1	1	1	0	1	1	2	0	1
Not specified	7	0	0	10	7	6	3	2	2	6	3

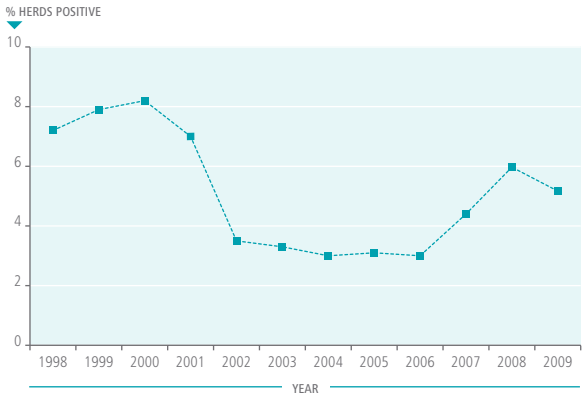
(Source: HPSC)

*2009 data are provisional and may change

ANIMALS

Bovine TB is a notifiable animal disease in Ireland and an ongoing national eradication program means that all herds are subject to test and control measures under the Diseases of Animals Act No. 6/1966, and must comply with Council Directive 854/2004/EEC. In addition, all animals slaughtered are subject to full ante-mortem and post-mortem examination in accordance with Regulation (EC) No 853/2004. The proportion of cattle herds in Ireland with bovine TB has been increasing since 2006. However, a slight reduction was noted in 2009 when the percentage of bovine TB was reported as 5.17%, compared to 5.97% in 2008 (Figure 6.1).

Figure 6.1. Annual bovine TB in Irish bovine herds based on Tuberculin testing, 1998-2009



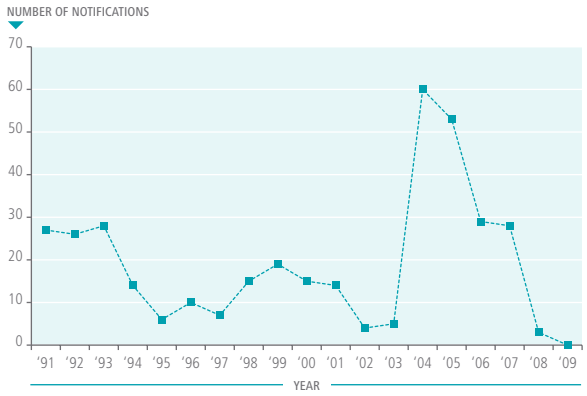
(Source: DAFF)

7. BRUCELLOSIS

HUMAN

The introduction of the notification of brucellosis in 2004, led initially to an increase in annual notifications (Figure 7.1.). However, a steep decline has been noted in recent years (particularly in probable cases) with 28 cases reported in 2007 (CIR 0.7), 3 in 2008 (CIR of 0.1) and none in 2009 (Table 7.1.). The European CIR for brucellosis was 0.08 per 100,000 population in 2009 (HPSC, 2010, EFSA 2011a).

Figure 7.1. Annual number of human brucellosis notifications, 1991-2009



(Source: HPSC)

Table 7.1. Confirmed and probable cases of brucellosis, 2004-2009

YEAR	CONFIRMED	PROBABLE	NOT SPECIFIED.
2004	2	57	1
2005	7	45	1
2006	4	25	0
2007	7	21	0
2008	2	1	0
2009	0	0	0

(Source: HPSC)

ANIMALS

Cattle

The last confirmed case of brucellosis in cattle in Ireland was in 2006. While 100 herds out of 117,287 tested positive serologically for brucellosis in 2009, further testing and detailed epidemiological investigations revealed that these were false positive reactions. There were in fact, no confirmed cases of cattle infected with *Brucella* spp. in this year.

Other animals

Ireland is officially free of ovine and caprine brucellosis, a disease caused by *B. melitensis*. A monitoring programme in sheep and goats is conducted by DAFF each year to demonstrate the absence of this disease. In 2009, a total of 25,000 goats and sheep were tested, and like previous years, no positive animals were identified.

8. TRANSMISSIBLE SPONGIFORM ENCEPHALOPATHIES (TSES) AND VARIANT CREUTZFELDT-JAKOB DISEASE (VCJD)

HUMAN

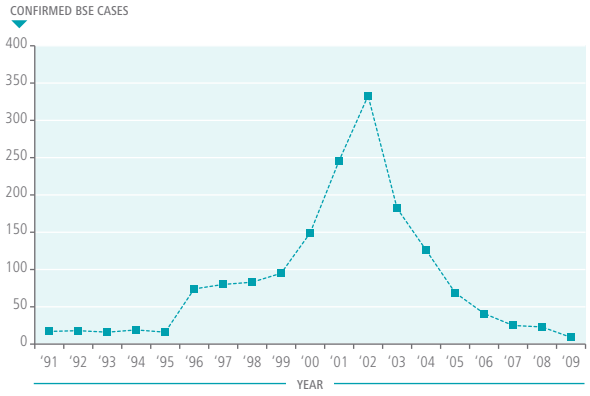
vCJD became a notifiable disease in Ireland in December 1996 and since then a total of 4 cases of vCJD have been notified. These cases have involved 2 males and 2 females ranging from 20 to 64 years of age, with 2 individuals having resided in the United Kingdom for long periods of time. One of these cases was notified in 1999, 2 in 2005 and 1 in 2006. There were no new notifications in 2009 (HPSC, 2010).

ANIMALS

Bovine Spongiform Encephalopathy (BSE)

The first case of BSE in Ireland was identified in 1989 and in the mid 1990s the incidence increased sharply. The number of cases in Ireland peaked in 2002 (333 cases), but since then a steady decline in BSE has been reported (Figure 8.1). This is mainly attributed to older animals in the national herd being replaced by younger animals, which were never exposed to contaminated feed. This trend continued in recent years with 25 cases reported in 2007, 23 in 2008 and 9 in 2009.

Figure 8.1. Confirmed cases of BSE in cattle, 1991-2009



(Source: DAFF)

The increasing age profile of animals confirmed with BSE (Table 8.1.), along with the declining number of cases, is convincing evidence that the enhanced BSE controls introduced in 1996 and early 1997 have been effective in bringing the disease under control.

Table 8.1. BSE cases by year of birth and year confirmed

YEAR OF BIRTH	YEAR OF DIAGNOSIS														
	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	TOTALS
1985						1									1
1986	2					1	2	1	1						7
1987	1	2	1				2					1			7
1988	3		2	1	2	1	4								13
1989	8	2	2		1	1	1	4	3		1				23
1990	20	11	2	2	1	1	9	2	1		1				50
1991	24	24	8	3	3	7	10	6	3	1	1	1			91
1992	16	28	25	13	8	8	10	8	13	2	1				132
1993		12	29	40	30	19	42	23	16	13	1	1			226
1994		1	14	30	44	52	54	34	20	22	7	8	6	2	294
1995				6	54	115	130	70	39	16	10	4	2	3	449
1996					6	40	62	32	21	7	15	6	10		199
1997							5	2	3		2		2		14
1998									4		1	1			6
1999							2		2	3					7
2000										3		2		1	6
2001										2	1		1	1	5
2002												1		1	2
2003													2		2
2004														1	1
Totals	74	80	83	95	149	246	333	182	126	69	41	25	23	9	1,535

(Source: DAFF)

Of the 808 cases diagnosed since the beginning of 2002, only 29 infected animals were born after the introduction of enhanced controls in 1997, 3 of which were diagnosed in 2008. Each of these anomalous cases in young animals has been investigated extensively by DAFF, with various possible scenarios being examined including the possible carryover of infectivity on the farm due to residual contaminated feed and possible background levels of atypical BSE. Since intensive testing began in 2002, the vast majority of animals detected with the disease were born between 1993 and 1996, and these numbers are in decline each year.

Transmissible Spongiform Encephalopathy (TSE) testing in ovine and caprine animals

Similar to previous years, none of the 95 goats tested in 2009 were positive for TSE. However, 38 (0.18%) out of 21,055 sheep tested in this year were positive for TSE. This is a slight increase on 0.09% of sheep reported positive in 2008.

9. TOXOPLASMOSIS

HUMAN

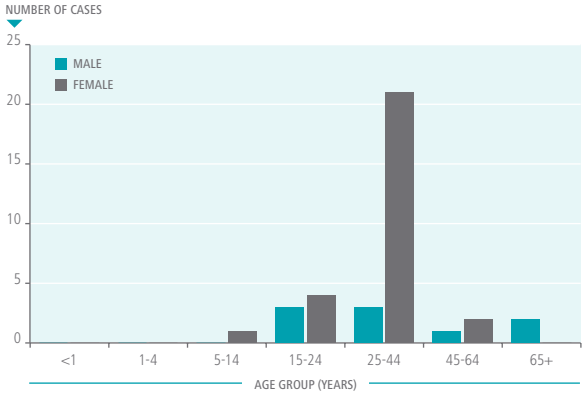
Toxoplasmosis became a notifiable disease in Ireland in 2004 and since then 257 cases have been reported (Figure 9.1.). In 2009, 37 cases were notified, a decrease on the 49 cases notified in 2008. The result was an Irish CIR of 0.83 per 100,000 population in 2009, compared to 1.2 in 2008. However, the Irish CIR was higher than the European figure (0.65 per 100,000 population) in this year (HPSC, 2010, EFSA 2011a).

Figure 9.1. Annual number of toxoplasmosis notifications, 2004-2009

(Source: HPSC)

In 2009, the 37 cases ranged in age from 14 to 77 years of age (Figure 9.2.), 28 of which were reported in females. The high number of cases reported among women of childbearing age may reflect enhanced testing during pregnancy (Table 9.2). No congenital cases were reported in this year.

Figure 9.2. Age-sex distribution of toxoplasmosis notifications, 2009



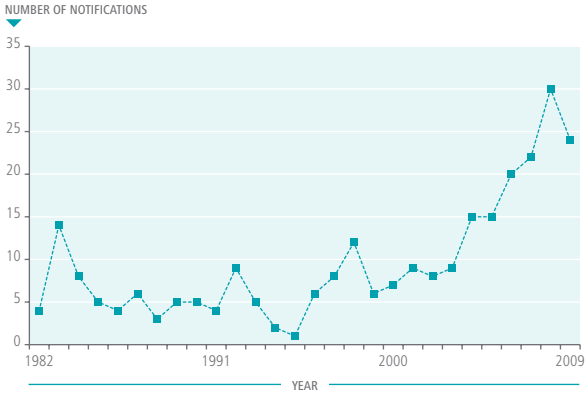
(Source: HPSC)

10. LEPTOSPIROSIS

HUMAN

Twenty-four cases of leptospirosis were notified in Ireland in 2009. This is a 20% reduction on the 30 cases notified in 2008 (Figure 10.1.). The CIR for Ireland was 0.57 per 100,000 in 2009, compared to 0.7 per 100,000 in the 2008 (HPSC, 2010)

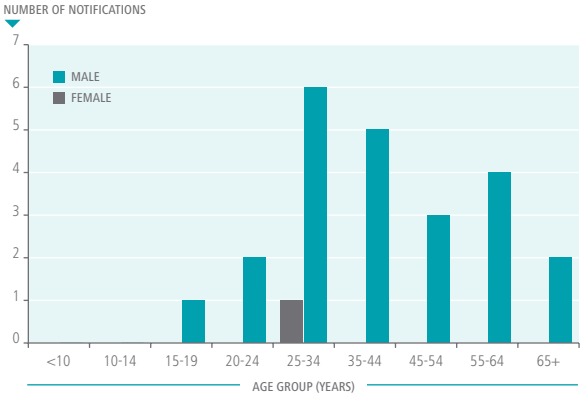
Figure 10.1. Annual number of human leptospirosis notifications reported, 1982-2009



(Source: HPSC)

Similar to previous years, the majority of cases occurred in males, with 23 cases (96%) notified in adult males in 2009 and 27 (90%) in 2008 (Figure 10.2). Nineteen cases required hospitalisation and no deaths were reported in 2009.

Figure 10.2. Age-sex distribution of human leptospirosis notifications, 2009



(Source: HPSC)

Seven cases (29%) were associated with occupational exposure (at least 3 of which were farming) and 7 with canoeing/kayaking (2 of which occurred outside of Ireland; in Asia and the United Kingdom). A further 3 individuals (13%) may have acquired infection while gardening/DIY or visiting a tropical destination and one case occurred from accidental exposure to river water, after the individual fell in. No risk factor information was available for the remaining 6 cases (25%).

Species information was available for 2 out of the 24 cases notified in 2009. One was identified as *Leptospira interrogans icterohaemorrhagiae* (rat reservoir), and the other *Leptospira interrogans hardjo* (bovine reservoir). The species were not reported in the remaining 22 cases.

11. TRICHINOSIS (TRICHINELLOSIS)

Trichinosis became a notifiable human disease in Ireland in 2004, but no cases were reported until 2007, when 2 Polish nationals contracted the disease. The individuals had been on holiday in Poland where they consumed lightly smoked sausage that was also linked to a large outbreak in Poland at that time. There were no notifications for trichinosis in Ireland in 2009, but the European CIR was 0.16 per 100,000 in this year.

In addition, an FSAI survey which sampled 10,247 slaughtered pigs from 33 low throughput slaughterhouses, between August 2007 and January 2009, found no samples positive for *Trichinella* spp. (FSAI, 2010b). These slaughterhouses were sampled as many of them source pigs from extensive or 'backyard' pig production systems, i.e. a sub-population considered to be more high-risk than intensively reared herds.

12. YERSINIOSIS

In 2009, 3 cases of yersiniosis (2 adults and 1 child) were reported, the same number as reported in 2008. Two cases were confirmed as *Y. enterocolitica* and one as *Yersisina* spp. This is a CIR of 0.07 per 100,000 population in 2009 and is less than the European CIR of 1.65 per 100,000 in this year (HPSC, 2010, EFSA 2011a).

13. Q FEVER

Seventeen cases of Q fever were notified during 2009, compared to 13 in 2008. This is a CIR of 0.4 per 100,000 population in 2009 and 0.3 in 2008. The Irish CIR was lower than the European figure of 0.51 per 100,000 in this year (HPSC, 2010, EFSA 2011a).

REFERENCES

Dept of Agriculture, Fisheries and Food (DAFF) (2009) National Reference Laboratory Antimicrobial Resistance (Food, Feed and Animal Health) Annual Report, 1-29. Available at: http://www.agriculture.gov.ie/media/migration/animalhealthwelfare/labservice/nrl/Annual%20Report%202009%20NRL%20AMR.pdf

European Centre for Disease Prevention and Control (ECDC) (2010) Annual Epidemiological Report on Communicable Diseases in Europe; Surveillance Report, 1-179. Available at: http://ecdc.europa.eu/en/publications/publications/1011_SUR_Annual_Epidemiological_Report_on_Communicable_Diseases_in_Europe.pdf

European Food Safety Authority (EFSA) (2011a) The Community Summary Report on Trends and Sources of Zoonoses and Zoonotic Agents and Food-Borne Outbreaks in the European Union in 2009 *EFSA Journal*, 9:2090, 1-378. Available at: http://www.efsa.europa.eu/en/reportingonzoonoses/zoonosescomsumrep.htm

European Food Safety Authority (EFSA) (2011b) Scientific Opinion on *Campylobacter* in broiler meat production: control options and performance objectives and/or targets at different stages of the food chain *EFSA Journal*, 2105 1-141. Available at: http://www.efsa.europa.eu/en/efsajournal/pub/2105.htm

European Food Safety Authority (EFSA) (2011c) Opinion of the Scientific Panel on Biological Hazards on the request from the Commission related to *Campylobacter* in animals and foodstuffs *EFSA Journal*, 173, 1-10. Available at: http://www.efsa.europa.eu/en/scdocs/doc/173.pdf

European Food Safety Authority (EFSA) (2010) Analysis of the baseline survey on the prevalence of *Campylobacter* in broiler batches and of *Campylobacter* and *Salmonella* on broiler carcasses in the EU, 2008, Part A: *Campylobacter* and *Salmonella* prevalence estimates. 2010; 8:1503. Available at: http://www.efsa.europa.eu/en/efsajournal/pub/1503.htm

European Food Safety Authority (EFSA) (2008) Request for updating the former SCVPH opinion on *Listeria monocytogenes* risk related to ready-to-eat foods and scientific advice on different levels of *Listeria monocytogenes* in ready-to-eat foods and the related risk for human illness. Scientific Opinion of the Panel on Biological Hazards (Question No. EFSA-Q-2007-064) *EFSA Journal*, 599, 1-42. Available at: http://www.efsa.europa.eu/en/efsajournal/pub/599.htm

European Food Safety Authority (EFSA) (2007) Monitoring of verotoxigenic *Escherichia coli* (VTEC) and identification of human pathogenic VTEC types. Scientific Opinion of the Panel on Biological Hazards (Question No. EFSA-Q-2007-036) *EFSA Journal*, 579, 1-61. Available at: http://www.efsa.europa.eu/en/scdocs/doc/579.pdf

Food Safety Authority of Ireland (FSAI) (2011) Recommendations for a practical control programme for *Campylobacter* in the poultry production and slaughter chain. Available at: http://www.fsai.ie/recommendationsforapracticalcontrolprogrammeforcampylobacterinthepoultryproductionandslaughterchain.html

Food Safety Authority of Ireland (FSAI) (2010a) Prevalence of *Campylobacter* spp. on Chicken Packaging and Retail Display Cabinets. Available at: http://www.fsai.ie/uploadedFiles/Monitoring_and_Enforcement/Monitoring/Surveillance/Prevalence%20of%20Campylobacter%20spp.pdf

Food Safety Authority of Ireland (FSAI) (2010b) Survey of the Prevalence of *Trichinella* in Local Authority Supervised Pig Slaughterhouses. Available at: http://www.fsai.ie/details.aspx?id=9593

Food Safety Authority of Ireland (FSAI) (2009a) Establishing Baseline Data on the Presence of *Listeria monocytogenes* on Cooked Meat Slicers in Retail and Catering Premises. Available at: http://www.fsai.ie/monitoring_and_enforcement/monitoring/surveillance/national_micrological_surveillance_2009.html

Food Safety Authority of Ireland (FSAI) (2009b) Microbiological safety of pre-packaged sandwiches. Available at: http://www.fsai.ie/monitoring_and_enforcement/monitoring/surveillance/national_micrological_surveillance_2009.html

Health Protection Surveillance Centre (HPSC) (2010) Annual Report 2009, Health Protection Surveillance Centre, 1-134. Available at: http://www.hpsc.ie/hpsc/AboutHPSC/AnnualReports/

National Salmonella Reference Laboratory (NSRL) (2010) Annual Report for 2009, 1-26. Available at: http://www.nuigalway.ie/research/salmonella_lab/reports.html

APPENDIX A
ZOONOSES-RELATED LEGISLATION

Diseases of Animals Act, 1966 (No 6 of 1966), as amended.

Infectious Diseases Regulation, 1981 (S.I. No. 390 of 1981)

Council Directive 64/432/EEC of 26th June 1964 on animal health problems affecting intra-Community trade in bovine animals and swine (S.I. No. 270 of 1981)

Council Directive 91/68/EEC of 28th January 1991 on animal health conditions governing intra-Community trade in ovine and caprine animals (S.I. No. 762 of 1992)

Commission Decision No. 2000/96/EC of 22nd December 1999 on the communicable diseases to be progressively covered by the Community network under Decision N° 2119/98/EC of the European Parliament and of the Council (S.I. No. 2 of 1996)

Regulation (EC) No 999/2001 of 22 May 2001 laying down rules for the prevention, control and eradication of certain transmissible spongiform encephalopathies (S.I. No. 252 of 2008)

Directive 2003/99/EC of 17th December 2003 on the monitoring of zoonoses and zoonotic agents amending Council Decision 90/424 and repealing Council directive 92/117 (S.I. No. 154 of 2004

Regulation (EC) No 2160/2003 of 17th November on the control of Salmonella and other specified food-borne zoonotic agents (S.I. No. 247 of 2008)

Regulation (EC) No 853/2004 of the European Parliament and of the Council of 29 April 2004 laying down specific hygiene rules for food of animal origin (S.I. No. 432 of 2009)

Regulation (EC) No 2073/2005 of 15th November 2005 on microbiological criteria for foodstuffs (S.I. No. 432 of 2009)

Food Safety Authority of Ireland
Abbey Court, Lower Abbey Street,
Dublin 1

Údarás Sábháilteachta Bia na hÉireann
Cúirt na Mainistreach, Sráid na Mainistreach Íocht.,
Baile Átha Cliath 1

Telephone: 01 817 1300
Facsimile: 01 817 1301
Email: info@fsai.ie
Website: www.fsai.ie

ISBN: 1-904465-82-X